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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/538,689	06/10/2005	Kouchiro Inomata	052684	6764

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EXAMINER

INGHAM, JOHN C

ART UNIT

PAPER NUMBER

2814

MAIL DATE

DELIVERY MODE

08/14/2007

PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

# Office Action Summary

## Application No.

10/538,689

## Applicant(s)

INOMATA ET AL.

## Examiner

John C. Ingham

## Art Unit

2814

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 01 June 2007.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1-50 is/are pending in the application.
- 4a) Of the above claim(s) 21-50 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-20 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 10 June 2005 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

## Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

## Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-8508)  
Paper No(s)/Mail Date \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_

### DETAILED ACTION

1. The amendments to the claims filed 1 June 2007 have been entered. The objections to claims 3, 7, 10 and 19-20 have been withdrawn.

### *Claim Rejections - 35 USC § 102*

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. Claims **1-20** are rejected under 35 U.S.C. 102(b) as being anticipated by EP 1 085 586, hereinafter the '586 Pub.

4. Regarding claims **1-5**, the '586 Pub discloses in Fig 10 a spin injection device characterized in that it comprises a spin injection part having a spin polarization part (102 antiferromagnetic layer fixes the spin of layer 103) capable of tunnel junction (§62), and an injection junction part (104, nonmagnetic insulating layer), an SyAF (105) having a first magnetic layer (105a) and a second magnetic layer (105c) having different magnitudes of magnetization (§58-59, thickness of free magnetic layers is different), and magnetically coupled together antiparallel to each other (§64) via a nonmagnetic layer (105b), wherein: said SyAF and said junction part are bonded, and a spin polarization electron is injected from said spin injection part, and magnetization of said first and second magnetic layers is reversed while maintained in antiparallel state (§59).

5. Regarding claim 6, the '568 Pub discloses in Fig 36 the device of claim 1, wherein the aspect ratio ( $T1/W$  and  $T2/W$ , ¶194) of the first and second magnetic layers of SyAf in contact with the injection junction part is less than 2.
6. Regarding claim 7, the '586 Pub discloses in Fig 10 a spin injection magnetic apparatus characterized in that it comprises a free layer (105) having a first and second magnetic layer (105a and 105c) coupled together magnetically antiparallel to each other via a nonmagnetic layer (105b), and in which magnitudes of magnetization are different (¶58-59, thickness of free magnetic layers is different), and the magnetization of said first and second magnetic layer is capable of magnetization reversal while maintaining the antiparallel state (¶64), and a ferromagnetic fixed layer (103) tunnel-junctioned (¶62) with said free layer via an insulating layer (104), wherein said ferromagnetic fixed layer and said free layer are made to be a ferromagnetic spin tunnel junction.
7. Regarding claims 8-12, the '586 Pub discloses in Fig 10 the apparatus of claim 7, provided with a spin injection part (102 antiferromagnetic layer fixes spin of ferromagnetic layer 103) having an injection junction part (104, nonmagnetic insulating layer) connected to said free layer (105, ¶58) and a spin polarization part (102, capable of tunnel junction ¶62).
8. Regarding claim 13, the '568 Pub discloses in Fig 36 the device of claim 7, wherein the aspect ratio ( $T1/W$  and  $T2/W$ , ¶194) of the first and second magnetic layers of SyAf in contact with the injection junction part is less than 2.
9. Regarding claim 14, the '568 Pub discloses in Fig 7 the apparatus wherein said spin injection part (71) may be a word line.

10. Regarding claims **15-18**, the '568 Pub discloses in Fig 10 a spin injection device characterized in that: a spin injection device comprising a spin injection part having a spin polarization part (102) including a ferromagnetic fixed layer (103) and an injection junction part (104) of a nonmagnetic layer, and a ferromagnetic free layer (105 made of Co or Co alloy, ¶40) provided in contact with said spin injection part, wherein: said nonmagnetic layer is made of an insulator, a nonmagnetic layer (106 made of Ru and 0.5 to 2.5nm thick ¶41) and a ferromagnetic layers (107 of Co or Co alloy ¶40) is provided on the surface of said ferromagnetic free layer, and an electric current flows in the direction perpendicular to the film surface of said spin injection device in order to reverse a magnetization of said ferromagnetic free layer (¶59).

11. Regarding claims **19 and 20**, the '568 Pub discloses in Fig 9 a magnetic apparatus (memory device) using the spin injection device of claim 17.

### ***Response to Arguments***

12. Applicant's arguments filed 1 June 2007 have been fully considered but they are not persuasive. Regarding the argument on page 14 that Inomata does not specify that the magnitude of the different magnetic layers is different from one another, Inomata (¶58) discloses that the layers may be of different thicknesses, which creates a different magnitude of the magnetic layers in accordance with the instant specification (¶47).

13. Regarding the argument on page 15 that the device of the present invention does not require an external magnetic field to be applied, a recitation of the intended use of the claimed invention must result in a structural difference between the claimed

invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim.

14. Regarding the arguments on pages 16 and 17, element 104 of Inomata (Fig 10) satisfies the limitation of an injection junction part as claimed (nonmagnetic insulator layer) and described in the specification (¶48, 53, an insulating layer capable of tunnel junction). Element 105 of Inomata is disclosed to be a free layer (¶58) that replaces a typical free layer (item 14 in Fig 9, see ¶56) for MRAM applications. The free layer 105 comprises two ferromagnetic layers with a nonmagnetic layer between them, and the entire layer 105 is in contact with said spin injection part (104).

### ***Conclusion***

15. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to John C. Ingham whose telephone number is (571) 272-8793. The examiner can normally be reached on M-F, 8am-5pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wael Fahmy can be reached on (571) 272-1705. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

John C Ingham  
Examiner  
Art Unit 2814

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/J. C. I./